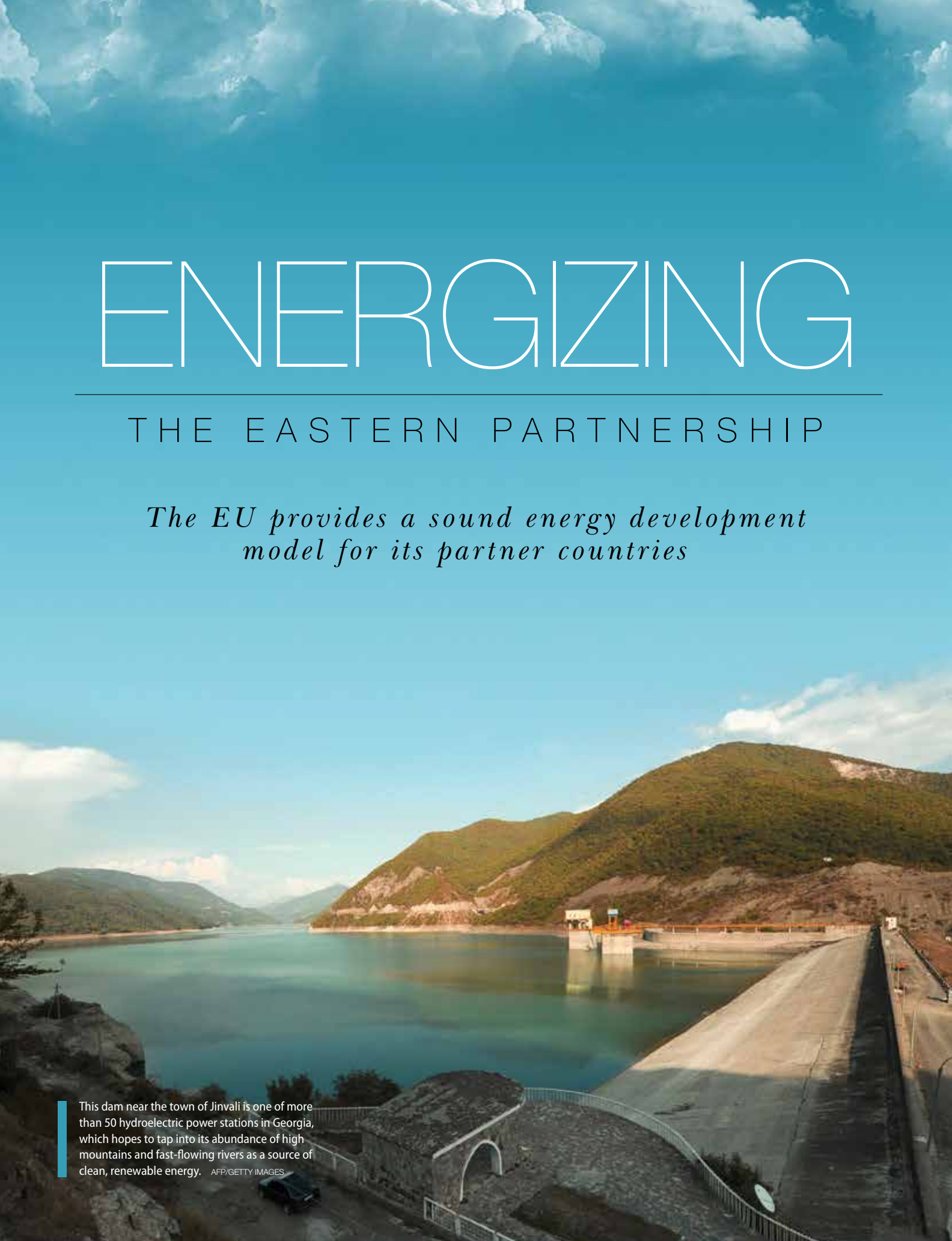


# ENERGIZING

THE EASTERN PARTNERSHIP

*The EU provides a sound energy development  
model for its partner countries*



This dam near the town of Jinvali is one of more than 50 hydroelectric power stations in Georgia, which hopes to tap into its abundance of high mountains and fast-flowing rivers as a source of clean, renewable energy. AFP/GETTY IMAGES

Energy development is a strategic priority of the Eastern Partnership (EaP). In recent years, the European Union has been intensively working with EaP countries, but their reluctance to develop and use new renewable energy opportunities has been a roadblock to strengthening energy security in the region.

Compared to the rest of the world, the EU has few energy supplies of its own, forcing it to adjust its energy policy goals. In the past decade, energy supply diversification has spurred tension in the EU. EaP countries can benefit from this hard-earned experience.

The main goal of the EU's Energy Community is to create an energy market with uniform prices for energy resources and electric power. Community members pledged to liberalize their energy markets and implement basic EU standards for electric power, natural gas, the environment and renewable energy. Moldova and Ukraine are among the Eastern partner countries that are full members of the Energy Community. Georgia is a candidate, and Armenia has observer status.

Besides creating an integrated energy market with new members, the EU set the logical and strategic goal to establish close ties with other Eastern European countries. Within the framework of the European Neighbourhood Policy, the European Commission adopted the EU's new EaP initiative in late 2008, aimed at developing relations with Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine.

The Energy Community and the EaP are mutually beneficial projects that enable EU countries to ensure their own energy security and provide an opportunity for EU neighbors to join the unified European energy market. The Eastern Partnership for Energy Security's thematic platform includes ensuring stable deliveries of energy, introduction of energy-saving

technologies and extensive use of renewable energy. In 2014, Georgia, Moldova and Ukraine signed Association Agreements with the EU that represented a new stage of cooperation and development.

EaP countries have different potentials, priorities and capabilities, including in the energy industry. Azerbaijan, with its wealth of experience mining hydrocarbons, can act as an exporter of energy resources. Georgia is a reliable transit country with an important exporting role from the shores of the Black Sea and has great potential in hydroelectric power and energy resource storage. Ukraine and Belarus are important transit countries in deliveries of gas to the EU. But this is the past. Conditions are changing from the traditional approaches of the energy industry to reinforce energy security and new opportunities. Anyone who is late will miss out.

#### ARMENIA (nuclear power)

During Soviet times, Armenia produced twice as much electricity per year as it does today. It generates 40 percent of its power from nuclear and 30 percent from gas-fired power stations. The remainder is from hydroelectric and other renewable sources. Armenia has no oil refining industry. All petroleum products are imported.

Plans for construction of a new nuclear power station remain on the table despite the EU's concern over safety. The currently operating plant reactor is the only one in the world that resumed operation after a complete shutdown and is located in an active seismic zone. It was to be shut down by 2016, but in 2014 the government decided to extend its operation until 2026 because of construction delays for the new nuclear power station.

In 2007, Armenia adopted the Program for Energy Conservation and Introduction of Renewable Energy Sources. Hydroelectric power is considered the most promising because

Armenia operates 162 small hydroelectric power stations with a total capacity of 277 megawatts (MW) and has issued licenses for the construction of 65 more with an estimated capacity of 131 MW.

The first wind farm network in the Caucasus was built in Armenia in 2005 with a capacity of 2.64 MW. The total capacity of currently profitable wind farms is estimated at 490 MW. By comparison, the capacity of a generating unit within a nuclear power station is 407 MW; however, wind is less efficient than uranium.

In 2014, the Ministry of Energy and Natural Resources approved a program aimed at building the country's first solar power stations, projects lasting an estimated five to six years. Development of geothermal power is promising. Among renewable sources, geothermal plants in Armenia will be more efficient since, unlike hydro and wind, they are able to operate at base-load capacity.

#### AZERBAIJAN (oil and gas)

The first oil well gushed in Azerbaijan in 1846. And according to a 2010 speech by Azerbaijan President Ilham Aliyev, the world's first offshore oil production occurred in Azerbaijan in 1949.

Azerbaijan possesses significant energy potential. Fossil-fuel power stations provide 85 percent of its power, with the remainder produced by hydroelectric stations. Thanks to energy efficiency measures, electricity consumption has decreased considerably but it is estimated that up to 40 percent more of the country's energy resources could be saved.

Azerbaijan's energy is delivered to Europe and world markets by seven pipelines — three oil pipelines toward Russia, Georgia and Turkey and four gas pipelines toward Turkey, Georgia, Russia and Iran. The Baku-Tbilisi-Ceyhan oil pipeline and the Baku-Tbilisi-Erzurum gas pipeline play a special role in regional and European

energy security. For Azerbaijan, energy security involves diversification of delivery routes, and for Europe, it is diversification of sources.

In 2019, Azerbaijan will begin transporting an additional 10 billion cubic meters of gas to Europe, and these volumes will increase over time. “We believe that the ‘Southern Gas Corridor’ will satisfy a minimum of 10 percent and possibly 20 percent of the European demand for gas,” Malena Mard, head of the EU delegation in Azerbaijan, said at a June 2014 energy conference in Baku. Gas will be exported to Turkey and on to European markets through the expansion of the South Caucasus Gas Pipeline and construction of the Trans-Anatolian (TANAP) and the Trans-Adriatic (TAP) gas pipelines.

The Caspian region holds sufficient energy to satisfy a considerable portion of the gas needs of Europe and China. The International Energy Agency estimates that Azerbaijan has enough oil and gas to supply exports over the next two decades.

Plans to expand renewable energy started in 2003 with a presidential decree to accelerate the generation of wind power. Construction of the first wind farm was planned but never materialized.

In December 2014, Azerbaijan announced plans to build a nuclear power station to be completed by 2020. This also impeded the development of renewable sources. Despite the so far insignificant use of wind energy in Azerbaijan, interest is increasing. The Gobustan Experimental Hybrid Range was created in 2011, which includes a 2.7 MW wind farm, a 1.8 MW solar power station, and a 1 MW biofuel plant. Renewable energy potential in Azerbaijan by source: solar, 5,000 MW; wind, 4,500 MW; bioenergy, 1,500 MW; geothermal, 800 MW; and small hydroelectric power stations, 350 MW.

## BELARUS (fossil fuel)

Belarus is dependent on external energy supplies, but also possesses two oil refineries. The country currently generates the bulk of its energy using fossil-fuel power stations. It envisions

diversification of the energy sector to include the development of hydroelectric power, construction of a nuclear power station and the use of local types of fuel.

Belarus produces approximately 30 billion kilowatt-hours (kWh) of electric power, but consumes 38 billion kWh, according to the Belarusian National Statistical Committee. Belarus is a country virtually without internal energy reserves. Most of the known oil deposits have been depleted, and production, which currently covers about 30 percent of the country's domestic needs, is in decline.

The only fossil fuel not in decline is peat, theoretically a renewable resource, which has minimum potential for replenishment in the short- or medium term. Peat is used primarily in households and still meets 25 percent of total energy needs.

Fossil-fuel power stations are the foundation of Belarus's electric industry, generating 99 percent of all electricity. The largest one generates more than 40 percent of all electric power, using gas and fuel oil.

Belarus devotes little attention to alternative energy. Belarusian experts believe that alternative energy will not become commercially attractive in the world for another 15-20 years; therefore, renewable energy is not considered a realistic alternative to Russian gas and oil at this time.

Belarus instead decided to build a nuclear power station, to be completed by 2018. It and several coal-powered stations will enable the country to reduce its dependency on natural gas as the main source of energy production by 2020, according to Lithuania's Centre for Geopolitical Studies.

The country's first wind farm—the largest in the Commonwealth of Independent States—was launched in May 2011 with a capacity of 1.5 MW. It meets local household needs, but due to the prevalence of low-velocity winds, the wind-power potential for Belarus is insignificant. According to the European Bank for Reconstruction and Development, Belarus also has “weak potential for use of solar energy.”

Biofuel is a more successful type of renewable energy in Belarus. The country has more than 10 biofuel plants. The largest, which was commissioned in 2012, has a capacity of 4.8 MW, inferior only to the biofuel complex in Penkun, Germany.

## GEORGIA (hydroelectric)

Georgia is an energy-dependent country in which 75 percent of the energy resources are imported. Its predominant natural resource is water. Georgia has the largest hydroelectric power station in the Caucasus, which generates up to 30 percent of its required electric power needs. Of the country's 26,000 rivers and streams, 300 have energy importance. Their annual potential is estimated at 15,000 MW.

More than 50 small hydroelectric power stations are operating, with 10 more under construction and several dozen more planned in the next decade. As a result, an additional minimum installed capacity of 3,000 MW will be created. The United States, Turkey, Norway and India are investing in this sector, but the main projects are financed by the government of Georgia.

By 2014, the country's total electric power production capacity will have increased to as much as 3,300 MW per year. More than 90 percent of Georgia's electricity consumption is being met from domestic sources. Georgia has two operating fossil-fuel power stations with a total capacity of up to 400 MW.

The Baku-Tbilisi-Ceyhan, one of the longest pipelines in the world at 1,768 kilometers, runs through Georgia. The Western route Baku-Supsa Oil Pipeline and the Baku-Tbilisi-Erzurum Gas Pipeline are also in operation.

Despite Georgia's sizable reserves of oil and gas, production is not being developed commercially. Investors have been geared toward making a quick profit, which does not facilitate the extensive use of new technologies.

Renewable energy resources other than hydroelectric power stations have been virtually unused. Georgia has considerable wind energy potential, with projected capacity estimated at up to 2,000 MW. In 2015, Georgia plans





This wind turbine near Kisielice in northern Poland is part of Eastern Europe's transition to renewable energy. Kisielice achieved 100 percent use of renewable energy in 2014.

AFP/GETTY IMAGES

to begin construction on solar power stations and wind farms in the north with a capacity of up to 400 MW.

Since the end of the last century, Georgia has used solar energy to heat water, but due to high equipment costs this process is not widespread. Considering the country's location, the effectiveness of solar radiation is quite high, with most regions having as many as 280 sunny days a year. According to expert calculations, use of solar energy in Georgia is most feasible in mountainous regions and remote places.

The potential of geothermal waters, up to 250 wells, also merits attention, but the comparatively low temperature makes it impossible to use them in electric power production. Considering the low production cost, using the wells to supply hot water is possible.

#### MOLDOVA (fossil fuel)

Fossil-fuel-powered electricity is the primary energy source in Moldova.

The entire electrical system is synchronized with Ukraine's. Moldova does not have oil refineries and depends almost completely, 91 percent, on imported energy resources. Electricity, gas and coal are supplied by Russia and Ukraine.

Oil products, mainly from Romania, account for about 40 percent of Moldova's energy imports. Virtually all natural gas is imported from Russia, but in 2014, the Iasi-Ungheni Gas Pipeline was opened from Romania. Within two years, it will provide a complete alternative source of gas.

Three fossil-fuel and three hydro-electric power stations providing a capacity of 1,195 MW are in operation. The Moldova regional power station, one of the largest fossil-fuel power stations in Europe, provides roughly half of the country's needs.

Inefficient use of energy is a serious problem. In 2012, a new energy strategy was adopted. It plans to maximize

use of domestic potential to produce electric power and increase the share of renewable energy sources to 25 percent by 2030.

Moldova's geographic and natural conditions favor energy development and production based on biomass. Solar energy also has great potential. The country has a fleet of solar collectors sufficient to provide an annual supply of electric power to nearly 100 apartments. The use of wind power is currently local in nature and based primarily on private initiative using low-power wind turbines. However, in the late 19th century, Moldova was the world's fifth largest user of wind power and had more than 6,000 windmills.

#### UKRAINE (fossil fuel)

Ukraine is an energy-short country. It produces only 25 percent of the gas and 20 percent of the oil it requires. The country obtains the bulk of its fossil fuels (about 85 percent) from

Russia. Its energy infrastructure is in serious need of repair and modernization, requiring an investment of \$100 billion. Forty percent of generating capacity is obsolete.

Ukraine has become one of the most energy-consuming economies in the world. According to the Ukrainian state statistical service, in 2013, Ukraine's energy usage consisted primarily of natural gas at 34.8 percent, coal and peat at 34.6 percent, and nuclear at 19.2 percent. The main fossil-fuel power stations are located in the Donbass, the site of the ongoing separatist conflict. The Zaporozhe Nuclear Power Station is the most powerful in Europe and second in the world, producing 6,000 MW. Hydroelectric power stations operate on the Dnieper and near Kiev.

Increasing the production of domestic gas is promising. The country has substantial gas reserves, but production has been stagnant for 20 years as imports have grown. Ukraine buys more gas than any other country in Europe.

Ukraine has underground storage facilities, the volume of which exceeds the equivalent combined capacity of all the leading countries of Western Europe. It is no coincidence that experts are discussing the prospects of creating a Central European gas hub based on Ukrainian storage facilities. The gas transport system makes Ukraine the main transit route for Russian gas to Europe, but Russia has announced it will be completely shut off in 2019.

Nuclear power is a strategically important element of the energy supply. In the 1970s and 1980s, the Soviet Union began building nuclear power stations in Ukraine. Chernobyl was the first. Four nuclear power stations operate in Ukraine today, with plans to build new ones by 2030.

Environmental factors limit development of electric power generation. Emissions from this sector account for about 30 percent of all solid particles entering the atmosphere,

comparable with metallurgy enterprises and outpacing all remaining sectors of industry. They are the main sources of acid rain. Construction of hydroelectric power stations on the Dnieper has resulted in large areas being flooded, and reservoirs have raised the ground water level.



Armenia's Metsamor nuclear power station near Yerevan is located on an active seismic zone and is the only nuclear power plant in the world to be reopened after a complete shutdown. AFP/GETTY IMAGES

Ukraine is the leader among EaP countries in the pace of renewable energy development. Its energy strategy through 2030 assumes a fourfold increase in the use of renewable energy. Wind energy potential is estimated at 330,000 MW, 60 times the installed capacity of Ukrainian electric power stations.

Solar energy has also been developed more in Ukraine compared to other EaP countries. In 2010 to 2011, Ukraine increased solar energy production 75-fold. In 2012, an Austrian company built what was then the world's largest solar power station in Crimea, with a capacity of 105 MW. Prior to Russia's annexation of the peninsula, renewable sources accounted for 20 percent of Crimea's electrical generation.

## NEW OPPORTUNITIES

In recent decades, the world economy has changed significantly with the depletion of easily accessible fossil fuels, the development of new technologies, the transition of developed economies to the post-industrial age and the awareness of global environmental problems.

Given the considerable advantages of renewable sources, there is little growth in this area. According to former U.S. President Bill Clinton, this is because the existing energy sector, operating on oil and coal, is well-organized, well-financed and well-connected politically, while new energy is decentralized, short of financing and less influential.

But it is gradually becoming ever more obvious that the future belongs to renewable energy, which we must work on today so as not to be late tomorrow. Fears of worsening environmental problems create new incentives for investing in renewable energy. In the last century, concerns were expressed about excessive dependence on imports, but worries about climate change rarely influenced politics.

According to data from the International Energy Agency, coal accounts for 42.2 percent of carbon dioxide emissions into the atmosphere; oil, 36.6 percent; gas, 19.8 percent; and all renewable energy sources together, only 0.4 percent. Efficient provision of incentives for using renewable sources combined with active environmental policies have enabled Western European countries to cut carbon emissions by 20-25 percent. France and Sweden have reported reductions of 60 percent.

Without state subsidies, energy production from renewable sources has not been commercially profitable. But in 2014, the renewable energy sector in the U.S. achieved a revolution: In some instances, the cost of electricity generated using renewables fell below that obtained from traditional gas- and coal-fired power stations, thanks to less expensive technologies and new approaches to financing and operating these facilities. And this is without counting state support.

Renewable energy has become a rapidly growing sector of the economy. According to estimates from the International Energy Agency, renewable energy production is increasing 10-20 percent annually in some EU countries. Germany leads the development of all types of renewable sources. Norway

(64.7 percent), Sweden (46.8 percent), Latvia (33.1 percent) and Finland (31.8 percent) are also leaders. Scotland announced plans to go completely “green” by 2020, and Denmark plans to move to 100 percent renewable energy usage. The Polish town of Kisielice achieved 100 percent use of renewable energy in 2014.

EaP countries are considerably dependent on fossil fuels, while environmental problems are increasingly threatening. Given this situation, the advantages of renewable energy are underestimated. When there is significant energy dependence, new opportunities must be used to strengthen energy security, which, in addition to environmental and other advantages, may contribute to economic growth and job creation.

The cheapest form of energy today is nuclear power, but the operation of older plants and the construction of new plants is increasingly expensive and potentially dangerous. It is difficult to guarantee high economic performance. The supply of raw materials, equipment, technical maintenance and waste recycling are fundamental issues.

## CHANGING TIMES

Given the changes in world energy, renewable energy should be introduced more aggressively. Experts predict that by 2035 the demand for oil in the world will have fallen by 13 million barrels a day from 30 million today. Even the world's largest oil and gas companies are increasingly developing renewable sources. In 2014, the Rockefeller Family Fund announced it would sell shares in oil and coal companies to invest in renewables.

In EaP countries, Belarus has an abundance of peat and timber, but they cannot be replenished quickly and replace oil. And if we continue to cut down forests worldwide, absorption of carbon dioxide gas will decrease drastically. For Belarus, hydroelectric power is costly and inefficient.

Over the last decade, Georgia has actively introduced economically feasible energy. Construction of hydroelectric power stations is booming, and although it is considered a renewable

source, it is the most undesirable for safety and ecology reasons, especially given Georgia's capacity for producing high quality drinking water. It is inadvisable to completely abandon hydroelectric power with its low generation costs. In the country's overall energy balance, hydroelectric power stations should have a stabilizing role, but not a main one.

Due to the lack of its own energy resources, Moldova's energy security is shaky. The EU also has quite modest energy resources, but it is using the new opportunities fairly effectively. In 2012, Germany achieved a world record for total electric power current capacity from solar batteries, approximately equivalent to 20 nuclear reactors.

In 2014, Ukraine encountered a critical energy shortage problem, although the problem of the country's dependence on imports from a single source has existed for decades. Experts note that Ukraine has the worst record in Europe in developing solar energy. Solar power stations can be built throughout Ukraine — a serious incentive for European companies interested in new markets.

## CONCLUSION

We should not underestimate the role of traditional energy sources, which constitute the foundation of energy production in the medium term. But there is no alternative to renewable energy sources for EaP countries in the near future. There must be an integrated approach. EaP countries are in transition. New environmental threats will appear, and developing energy policies while demand increases for traditional resources will be difficult. These governments have never encountered such problems before.

EaP countries have the opportunity to effectively use the existing potential provided by the EU in developing renewables and energy efficiency. But it is extremely important that they begin using their own renewable resources without waiting for assistance.

The pace of development and the future of renewable sources in EaP countries depends completely on the level of government support.

Reasonable subsidies, which will help attract investment in renewable energy sources, are essential. But a balance must be maintained since excessive subsidies worsen energy security. Unreasonable subsidies and the artificial lowering of energy prices encourage wasteful consumption, increase energy price instability, stimulate counterfeiting and smuggling of fuel, and undermine the competitiveness of renewable energy sources and more efficient energy technologies.

Development of new technologies must also be a priority for governments. Investment in oil production is falling. This creates new conditions and opportunities for the development of renewables. According to the UN World Energy Development Program, developed countries in the 21st century will be those that aggressively sought wind energy.

The limited nature of the hydrocarbon resource base and conflict over these resources are forcing an increasing number of countries to turn to nuclear energy. But the most progressive countries, including European countries, are gradually abandoning nuclear energy. A whole series of international development banks are refusing to finance nuclear programs, pointing to their lack of competitiveness and increased risks.

EaP countries must rely on European experience and the know-how of independent analytical centers. They need to develop ambitious strategies for the development of renewable energy, which will enable them to accelerate development.

To strengthen energy security, it is extremely important for EaP countries to cooperate with each other in the development of renewable energy.

EaP countries are limiting freedom of action because it involves difficult issues of responsibility. But for a government, there is nothing more important than accepting responsibility to build a better future. As noted by Frank Crane, a 20th century clergyman and columnist: “Responsibility is the thing people dread most of all. Yet it is the one thing in the world that develops us.” □